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ISSUE HIGHLIGHT

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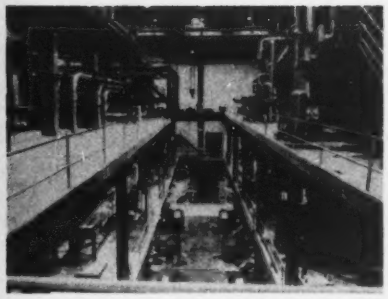

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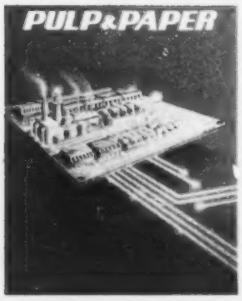

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Cover: Advanced process control—trends, developments, is the subject of a special seven-article focus in this issue. Cover art by Rik Olson depicts the continually expanding role of this vital technology in the pulp and paper industry.

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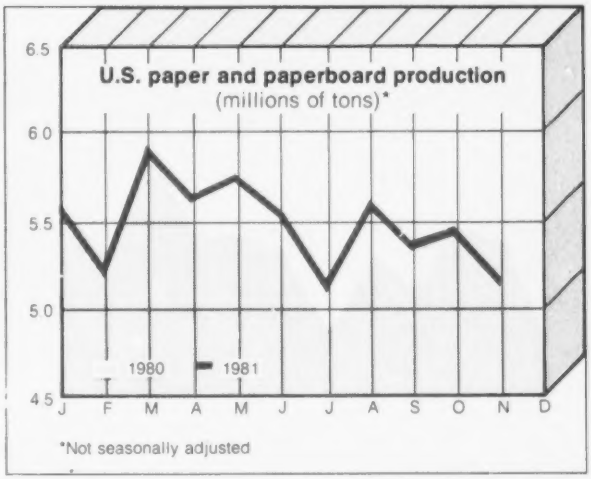
U.S. paper and paperboard production came to 5.2 million short tons in October, bringing the seasonally adjusted annual rate for the October-November period down to 62.9 million tpy, compared to 65 million tpy in the previous two-month period, according to the American Paper Institute. The declines in the period followed relatively high rates of production, so output in the first 11 months was at a seasonally adjusted rate of 65 million tpy, 2.4% over its year-earlier level.

Among major grades, newsprint was the only paper grade to show strength for the month, up 11% over year-ago levels. Uncoated groundwood and free-sheet grades continued their slowdown in November, and coated papers showed a weakening trend. Declines in paperboard were steeper than those for paper, with production for all major grades below year-ago levels. Construction grade output was about 15% below year-ago.

Total Canadian newsprint shipments were 773,000 metric tons in November, up 2.0% over a year ago, according to the Canadian Pulp & Paper Assn. Mill operating rates were 96% vs 93% in November 1980, bringing the year-to-date operating rate to 94%.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	November	438	10.9	5,265	12.3
Uncoated groundwood (s)	November	118	−1.7	1,451	−3.2
Coated paper (s)	November	399	0.5	4,976	6.8
Uncoated free sheet (s)	November	828	−0.8	7,974	−0.5
Unbleached kraft packaging and industrial (s)	November	319	1.9	3,917	−1.0
Tissue	November	370	0.5	4,505	2.5
Total paper	**November**	**2,531**	**2.2**	**31,265**	**3.3**
Kraft linerboard, unbleached	November	1,175	−1.7	14,892	3.4
Semichemical medium	November	370	−8.4	4,790	0.6
Bleached paperboard	November	316	−0.9	3,990	2.6
Recycled paperboard	November	551	−8.6	7,206	1.4
Total paperboard	**November**	**2,481**	**−4.7**	**31,976**	**2.3**
Total paper and paperboard*	**November**	**5,173**	**−2.0**	**65,448**	**2.1**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	October	4,873	6.9	52,691	3.4
Market pulp production	October	559	1.6	6,275	−4.1
Wastepaper consumption at paper/board mills	October	1,261	1.0	14,812	4.4
Pulpwood consumption (cords)	November	7,058	4.1	80,984	−0.1
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	November	18.189	−2.6	227.439†	2.4
Containerboard inventories at box plants	Nov. 1	2,437	29.6		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	October	784	10.7	8,357	−6.2
Imports of Canadian newsprint	October	645	11.8	6,911†	−3.6
U.S. paper exports (including products)	October	330	−39.6	4,741	−9.4
Exports of unbleached kraft linerboard	November	151	−7.4	1,864	−23.0
Exports of woodpulp	October	275	−19.4	3,715	−4.3
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	November	773	12.0	8,117†	2.9
Operating rates	November	96%	93%	94%	95%
Inventories held by U.S. consumers	Nov. 30	1,477	−0.3		
Woodpulp shipments (export only)	November	n.a.		n.a.	
Operating rates	November	n.a.		n.a.	

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

(News section continues on page 21)

Linerboard: Lower operating rates due to soft demand, new capacity

Statistics	1980	1981	1982e
Production, 000 tons	14,232	14,651	14,330
Capacity, 000 tons	14,586	15,340	16,086
Utilization rates, %	97.6	95.5	89.1
Imports, 000 tons*	30	35	25
Exports, 000 tons*	2,293	1,800	1,930
Apparent U.S. consumption			
000 tons	11,969	12,886	12,425
lb/capita	105.1	112.1	107.0
000 tons/$ billion real GNP	8.08	8.50	8.35

*Commerce Dept. data. e=estimated

Grade structure: Unbleached linerboard is made in a wide range of basis weights. The standard kraft liner is 42 lb/1000 ft², but other important grades are made in weights of 26, 33, 38, 69, and 90 lb. Major end use is in containerboard for corrugated containers. A small amount of liner is produced from recycled fiber (and is referred to as "test" liner) but is not included in these figures.

Production/capacity: Linerboard production in 1981 rose an estimated 2.9% to 14.65 million tons, helped by an increase of about 2.1% in corrugated box shipments and by inventory building. Inventories of both liner and medium at box plants and mills rose nearly 600,000 tons last year to more than 2.5 million tons by Dec. 1.

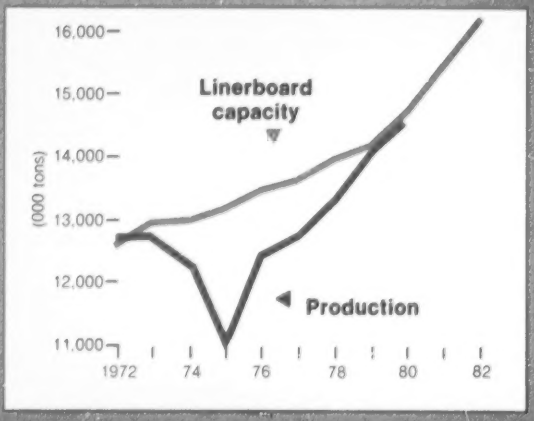
Export shipments of unbleached liner dropped about 22% from 1980's record level of 2.29 million tons, reflecting recession in Europe and Japan, the increased value of the U.S. dollar, and lower shipments to the People's Rep. of China, which made heavy purchases in 1980.

Domestic demand began to weaken in the fourth quarter, and many linerboard mills took extended holiday downtime in December. Operating rates for the year, however, averaged a still respectable 95.5%.

Outlook: With little or no domestic economic growth forecast for 1982, corrugated box production is projected to rise by 0.7% to 260.45 billion ft², resulting in domestic liner demand of 12.43 million tons. Export shipments are forecast to rise about 7% to 1.93 million tons, led by a recovery in demand from the Far East. Assuming inventory levels remain relatively unchanged, this would indicate total unbleached liner production of 14.33 million tons, down 2.2% from 1981.

Capacity is expected to jump by 4.9% to 16.09 million tons in 1982, with the startup of International Paper's 460,000-tpy Mansfield, La., machine and Stone Container's 105,000-tpy Florence, S.C., machine in late 1981; and Weyerhaeuser is scheduled to bring on a new 200,000-tpy machine at Valliant, Okla., later this year.

The sharp jump in capacity, together with the projected decline in production, could push operating rates as low as 89% for all of 1982. Phaseout of 185,000 tpy of liner at International Paper's Georgetown, S.C., mill in the first quarter of 1981 (not included in the capacity figures), however, will make actual rates somewhat higher. But any inventory liquidation from current high levels or rescheduling of kraft paper machines to liner production due to competition from plastics would have an adverse affect on operating rates.



Estimated annual capacities of major U.S. companies are:

	Annual capacity[1] (000 tons)	Capacity share (%)
1. International Paper Co.[2]	1625	10.1
2. Union Camp Corp.	1250	7.8
3. Weyerhaeuser Co.	1150	7.1
4. St. Regis Paper Co.	910	5.7
5. Champion International Corp.	880	5.5
6. Mead Corp.[3,4]	780	4.8
7. Inland Container (Time)[3,4]	780	4.8
8. Container Corp. of America	750	4.7
9. Continental Forest Industries	700	4.4
10. Owens-Illinois Inc.	695	4.4
11. Great Northern Nekoosa Corp.	680	4.3
12. Westvaco Corp.	600	3.7
13. Stone Container	580	3.6
14. Willamette Industries	500	3.1
15. Southwest Forest Industries	430	2.7

1. Machines that swing between linerboard and kraft paper make exact capacity estimates difficult.
2. Excludes 185,000 tpy of capacity to be phased out this spring as part of Georgetown, S.C., mill conversion to bleached grades.
3. Includes 50% share in Georgia Kraft Corp.
4. Includes some carrier stock.
5. Excludes 120,000 tpy from machine to be converted to newsprint at Snowflake, Ariz., mill this spring.

U.S. capacity (1982)**: 16.086 million tons**
Capacity share of top five companies: 36.1%
Capacity share of top ten companies: 59.2%

Pricing: Weakening demand and startup of the two new machines triggered a round of $30/ton rebating from $300 list-price levels in December and January. The poor pricing performance of linerboard in recent years has resulted in lower profitability than on many grades, and discouraged new capacity additions (42-lb at year-end): 1980, $270/$300; 1979, $270; 1978, $220; 1977, $195; 1976, $210; 1975, $202.

Export list prices have remained at the same $377 level (c.i.f. northern Europe) since the second quarter of 1980 and have shown the following pattern (36 lb+ at year-end): 1979, $323; 1978, $255; 1977, $222; 1976, $222; 1975, $276. There has been considerable discounting, however, from list prices in Europe and most Far Eastern markets.

U.S. capacity hikes in 1982-84 to slow slightly from fast 1980-82 pace

Biggest growth seen in semichemical paperboard; coated groundwood and newsprint will jump too, while drop is seen in construction grades

By DAVID R. ALLAN, News Editor

□ U.S. paper companies are slowing their capacity growth rate slightly from the hot pace of the 1980-82 period, and planned expansions in the 1982-84 time period are also below the average for the years 1967-81, according to the American Paper Institute's annual capacity survey.

The biggest increases in capacity envisioned in the latest survey are in semichemical paperboard, semichemical pulp, newsprint, printing and writing papers, and mechanical pulp, while capacity in the construction grades is expected to drop marginally. The strength in semichemical capacity, which is a continuation of a trend shown in last year's study, will redress by 1984 the current imbalance with linerboard, where capacity is growing at only 2.1%/year.

Overall paper and board capacity will grow by 5.0 million tpy during the three years covered by the survey, to 77.2 million tpy, while woodpulp capacity will increase by 3.4 million tpy to 60.3 million tpy. These increases represent growth rates of 2.3%/year and 2.0%/year, respectively—slightly below the 2.4% and 2.5% annual averages of the 1967-81 period and the 2.9% and 2.8% annual averages expected two years ago for 1980-82.

Newsprint rate slows

The torrid pace of U.S. newsprint capacity increases in 1980 and 1981—when 1.1 million tpy was added, exceeding the total gain in capacity over the previous ten years—will slow down in 1982-84 to a 608,000-tpy gain, a 3.7%/year growth rate, with a new machine and the conversion of an existing machine being the only announced projects.

Coated groundwood mills will continue the recent capacity growth trend, which has already led to a temporary surplus in supply. The 21.7%/year rate of coated groundwood mills leads the printing and writing grades, where capacity increases overall will average 3.5%/year, totaling 1.9 million tpy of new capacity through the year 1984. Uncoated free-sheet manufacturers will increase capacity by 8.4%, bringing on five new machines, while coated free-sheet and uncoated groundwood mills will show modest capacity increases.

Slow growth will also be seen in tissue capacity, and modest scheduled increases might even be partially offset by continued shutdown of old machines. Steady, although unexciting, expansion in tissue demand, which has averaged 1.5%/year in recent years, will be matched by a 1.7%/year capacity increase during the 1982-84 period, with capacity going up by only 260,000 tpy. This is slower than expected in recent surveys, and includes only one entirely new machine.

Only one new liner machine

One kraft linerboard machine started up early and

Table 1. **U.S. pulp and paper industry average annual capacity growth**

	1970-79	1979-81	1982-84
Total paper/board	**2.1%**	**2.4%**	**2.3%**
Total paper	**2.3**	**2.7**	**2.9**
Newsprint	2.6	6.5	3.7
Printing, writing and related	2.9	2.5	3.5
Packaging, industrial converting	0.9	0.3	1.3
Tissue	2.4	3.5	1.7
Total paperboard	**2.0**	**2.5**	**2.0**
Unbleached kraft	2.7	3.1	2.1
Solid bleached	2.0	1.9	0.2
Semichemical	2.2	2.7	4.0
Recycled	0.4	1.5	1.3
Total construction grades*	**1.7**	**0.2**	**0.5**
Total woodpulp	**2.1**	**2.4**	**2.0**
Dissolving, special alpha	0.8	0.6	—
Sulfite	2.0	1.6	0.8
Sulfate	2.8	2.5	1.5
Semichemical	2.1	1.7	3.9
Mechanical	0.7	4.6	3.2

*Includes wet machine board.
Source: American Paper Institute.

two major expansions have been delayed beyond 1984, with the result that only one new liner machine is now scheduled to start up in this period. Capacity will still grow by 1.1 million tpy, a 2.1%/year rate, down from the 2.5%/year rate that was anticipated for 1981-83 in last year's survey.

Working to offset the recent supply imbalance in favor of linerboard, U.S. semichemical paperboard manufacturers will add capacity at a 4%/year rate, the hottest growth rate in the current survey. This only represents one new machine, but also includes tonnage from a new machine that started up in December 1981, along with improvements and an absence of currently planned permanent shutdowns.

While the containerboard grades are growing at a healthy rate, capacity of solid bleached sulfate board will be flat during this period, and indeed between 1980 and 1981 it even dropped by 165,000 tpy, a good indicator for future operating rates. However, this follows a period in the late 1970s when capacity was added at a rapid rate, however.

Recycled paperboard mills plan to add 352,000 tpy of capacity in the period between 1982-84. However, a further 415,000 tpy of currently idled capacity could become permanently idled during the period. This would come on top of 332,000 tpy already shut down and removed from the present survey.

Suffering from a similar erosion of old capacity, capacity in the construction grades will decrease by 0.5%/year. This is in addition to a net reduction of 144,000 tpy that has already been recorded between 1980 and 1982 estimates. During the period from 1980-82, 298,000 tpy was idled.

Table 2. **Paper/board annual capacity, 1981-84**
(000 short tons)

	1981	1982	1983	1984
Total paper/board	**72,148**	**74,558**	**76,031**	**77,162**
Total paper	**33,639**	**34,927**	**35,746**	**36,651**
Newsprint	5299	5583	5710	5907
Printing, writing	17,331	18,011	18,556	19,230
Uncoated groundwood	1658	1774	1779	1784
Coated groundwood	3081	3364	3652	3750
Coated free sheet	2226	2254	2359	2492
Uncoated free sheet	8791	9017	9123	9532
Cotton fiber	143	142	143	144
Thin papers	373	372	372	373
Solid bleached bristols	1060	1088	1127	1155
Packaging and industrial converting	5947	6140	6183	6191
Unbleached kraft	3991	4167	4196	4223
Bleached packaging and industrial converting	558	559	559	545
Specialty packaging	533	539	540	531
Special industrial	865	875	888	892
Tissue	5062	5193	5297	5322
Total paperboard	**34,245**	**35,428**	**36,087**	**36,313**
Unbleached kraft	16,685	17,422	17,661	17,765
Kraft linerboard	15,340	16,086	16,307	16,396
Solid bleached	4015	4049	4048	4037
Semichemical	4952	5180	5477	5566
Recycled	8593	8776	8901	8945
Total construction paper/board	**4264**	**4203**	**4198**	**4198**

Source: American Paper Institute.

Dramatic TMP increase planned

Sulfate and soda pulp growth rates will fall to 1.5%/year, which is well below the long-term growth rate of 3% and also less than the growth rate of papers and boards produced from these pulps—representing postponement of several large expansion projects, increasing use of wastepaper, and fuller utilization of existing pulp capacity. Capacity will increase by 1.9 million tpy, with the 3.9%/year growth rate of semichemical pulp, fueled by the accompanying jump in semichemical board, leading the way along with mechanical pulp's 3.2%/year rate.

Thermomechanical pulp capacity will grow by 464,000 tpy, which is a 10.7%/year growth rate. This will occur largely on the strength of additions to newsprint capacity.

Table 3. **Woodpulp annual capacity, 1981-84**
(000 short tons)

	1981	1982	1983	1984
Total woodpulp	**57,010**	**58,470**	**59,603**	**60,303**
Dissolving	1590	1590	1590	1590
Chemical paper grades	43,172	44,092	44,733	45,148
Sulfite paper grades	1898	1905	1911	1946
Sulfate, soda paper grades	41,274	42,187	42,822	43,202
Bleached softwood*	11,649	11,843	12,031	12,194
Bleached hardwood*	8530	8683	8839	9001
Unbleached	21,095	21,661	21,952	22,007
Semichemical	4665	4826	5160	5228
Mechanical	7513	7890	8049	8226
For paper, paperboard	5482	5870	6029	6246
For other paper, board	2031	2020	2020	2020
Screenings	70	71	71	71
Total machine-dried pulp	**9423**	**9578**	**9730**	**9772**
Dissolving	1590	1590	1590	1590
Chemical paper grades	7726	7888	8040	8081
Sulfite	506	489	489	489
Bleached sulfate	7028	7228	7387	7429
Unbleached sulfate	192	170	164	164
All other	107	100	100	100

*Includes semibleached.
Source: American Paper Institute.

Table 4. **Market pulp capacity, 1981-84**
(000 short tons)

	1981	1982	1983	1984
Total market pulp	6978	7022	7110	7029
Dissolving	1563	1563	1563	1563
Chemical paper grades	5398	5449	5537	5456
Kraft	5035	5143	5231	5150
Bleached*	4860	4990	5086	5004
Unbleached	175	153	146	146
Sulfite	363	305	305	305
All other	17	10	10	10

*Includes semibleached
Source: American Paper Institute

Wastepaper consumption continues to rise very slowly as a percentage of total fiber supply, growing from 22.8% in 1980 to 23.2% in 1984. Consumption is expected to rise from 15.1 million tons in 1980 to 17.8 million tons in 1984.

Market pulp capacity will remain flat during this period, with no major grade showing significant increases, in contrast with 5.2%/year growth rates since 1977. Use of existing pulp capacity to provide fiber for new paper or board machines, along with the announced delay in start-up of at least one major market pulp mill, were named as reasons for this by API.

API statistics also showed that between 1976 and 1980, the percentage of paper and board capacity represented by mills over 175,000 tpy in size was rising from 60.7% to 65.1%, while the capacity of paper and board mills integrated to woodpulp was rising from 74.0% of all capacity to 77.2%.

New machines will provide 3.36 million tpy of planned new capacity, with greenfield mills representing only 235,000 tpy and various improvements another 1.4 million tpy.

In the three years from 1980 through 1982, API removed 1.4 million tpy of permanently idled capacity from its lists and says that another 609,000 may go in the next survey. □

Table 5. **New paper and paperboard machines, 1982-1984**

Grades	Number of machines
Paper	—
Newsprint	1
Coated gwd.	3
Coated free sheet	1
Unctd. free sheet	5
Unbld. kraft paper	1
Tissue	1
Paperboard	—
Unbleached	—
Kraft linerboard	2
Semichemical	1
Total	**15**

Table 6. **Mills and machines shut down, 1980-82**

	Machines	Mills	Annual capacity (000 short tons)
Paper			
Newsprint	—	—	—
Printing-writing	16	2	186
Packaging and industrial converting	8	2	97
Tissue	18	7	138
Paperboard			
Unbleached kraft	4	—	262
Bleached kraft	—	—	—
Semichemical	3	1	128
Recycled	18	8	332
Construction grades	17	11	298
Total	**84**	**31**	**1441**

Table 7. **Announced major capacity additions**

Company	Location	Grade	Annual capacity
1981			
Boise Cascade	Rumford, Maine	Coated groundwood	160
Buckeye Cellulose	Oglethorpe, Ga.	Bleached sulfate pulp	300
Fort Howard Paper	Muskogee, Okla.	Tissue	85
Georgia-Pacific	Palatka, Fla.	Tissue	60
International Paper	Mansfield, La.	Unbleached kraft linerboard	460
International Paper	Mansfield, La.	Semichemical paperboard	270
Madison Paper	Madison, Maine	Uncoated groundwood	160
Mead*	Chillicothe, Ohio	Uncoated free sheet	154
North Pacific Paper	Longview, Wash.	Newsprint	210
Scott Paper	Everett, Wash.	Tissue	54
1982			
Mead	Escanaba, Mich.	Coated groundwood	200
St. Regis Paper	Pensacola, Fla.	Unbleached kraft paper	236
St. Regis Paper	Sartell, Minn.	Coated groundwood	170
Stone Container**	Florence, S.C.	Unbleached kraft linerboard	105
Weyerhaeuser	Columbus, Miss.	Coated groundwood	175
Weyerhaeuser	Valliant, Okla.	Unbleached kraft linerboard	200
Willamette Industries**	Hawesville, Ky.	Uncoated free sheet	100
Wisconsin Tissue*	Menasha, Wis.	Tissue	65
1983			
Abitibi-Price	Augusta, Ga.	Newsprint	225
MacMillan Bloedel	Pine Hill, Ala.	Semichemical paperboard	210
Scott Paper	Skowhegan, Maine	Coated free sheet	200
1984			
Champion	Courtland, Ala.	Uncoated free sheet	150
Crown Zellerbach	Camas, Wash.	Uncoated free sheet	160
Union Camp	Eastover, S.C.	Uncoated free sheet	215
Weyerhaeuser	Columbus, Miss.	Uncoated free sheet	200

*Will replace existing facilities, net increase not announced
**Machine started up in late 1981, after release of survey but ahead of schedule

Papermakers' alum continues steady course

By BARRY SHOCKETT

Consumption of papermakers' alum has not fluctuated to any marked degree and is not expected to show any startling swings in the immediate future.

Most aluminum sulfate end-use markets in the U.S. and Canada are mature, therefore end-uses have not changed appreciably over the years. The exception is sewage treatment for phosphate removal in Canada.

The trend to neutral or alkaline sizing has clouded the long-range outlook for alum and could reduce consumption significantly by 1990.

U.S. statistics for aluminum sulfate, 17% Al_2O_3 (000 short tons)

	1978	1979	1980	1981e
Nameplate capacity*	2300	2400	2300	2550
Production	1309	1313	1182	1302
Shipments	1214	1216	1151	1296
Imports	20	24	26.8	28
Exports	23	26.5	11.6	26.5
Apparent U.S. consumption	1211	1213.5	1166	1297.5

*Based on industry estimates of operating rates
Source: Bureau of Census, Dept. of Commerce

Canadian statistics for aluminum sulfate (000 short tons)

	1978	1979	1980	1981e
Nameplate capacity	253.5	275	275.5	275.5
Production	185.5	195.5	199	202
Total demand	173.5	177.5	178.5	182.5
Internal paper sizing	53	55	55	56
Other pulp and paper	54	54	53	54
Municipal water/sewage	50	51.5	53	54.5
Miscellaneous*	16.5	17	17.5	18
Exports	15	22	22	23
Imports	3	4	1.5	3.5

*Including pigments

ALUMINUM SULFATE

UNITED STATES

Uses: Aluminum sulfate is used in the paper industry for process water treatment, pitch control, and internal rosin sizing. Nonpaper applications are dominated by potable-water and waste-water treatments.

Demand: In 1981 the paper industry used an estimated 656,000 tons of alum, or 51% of the total demand of about 1.3 million tons. Potable water and waste treatment required about 490,000 tons (38%).

Sources: The production of aluminum sulfate, which consists of 15 manufacturers, is dominated by three major producers. Allied Chemical, American Cyanamid, and Stauffer Chem are the three major producers accounting for 75% to 80% of industry capacity. Since 1979, annual capacity increases, have averaged 4.5%.

Availability: There is ample industry capacity available (almost 50%) to handle any eventuality, and no shortages are foreseen.

Pricing: Prices of alum have not changed since July 1, 1981, when the price in the northeast and north-central areas rose $12/ton to $133/ton for bulk, liquid (17% Al_2O_3), f.o.b. works, freight equalized. For the past two years alum prices have been raised at the beginning of the year and in mid-summer. However, no increases are expected in 1982 much before the summer months. Pricing history: 1981, $121-$131/ton; 1980, $101-$109/ton; 1979, $89-94/ton.

Forecast: The paper industry's share of total alum demand in 1982 is expected to remain constant (51%), although actual mill usage may decline slightly. On the other hand, waste-water treatment's portion of the market may increase a percentage point. Total alum demand should be between 1.2 and 1.3 million tons.

CANADA

Demand: Over the past three years between 60% and 62% of total alum consumption has been accounted for by the pulp and paper industry, slightly more than 50% for rosin size and the balance for pitch control and other mill applications. In 1980, 55,000 tons of aluminum sulfate were used for rosin sizing and an additional 53,000 tons for pitch control. Total alum consumption in 1980 was 178,500 tons. Last year, the pulp and paper industry used an estimated 110,000 tons (56,000 tons for sizing applications) out of a total domestic demand of 182,500 tons.

Sources: There are 13 plants producing aluminum sulfate in Canada. The two major producers, Alcan Smelters & Chemicals and Allied Chemical Canada, account for almost 80% of the total capacity. The next largest include Inland Chemicals (a CIL subsidiary), Border Chemical, and United Chemicals.

Availability: Following a more than 100% capacity expansion by Inland in 1980, total Canadian capacity is sufficient to handle future demands through the 1980s. 1982, market; 1981, market; 1979, market to tight.

Pricing: The price of liquid (17% equivalent Al_2O_3) aluminum sulfate, unchanged for most of 1981, rose to $145/metric ton ($135/short ton), f.o.b. plant on January 1. It ranged from $111-$132/metric ton ($100.70-$119.75/short ton) in 1981. Pricing history: 1980, $86-$100.70/ton; 1979, $79-$86/ton.

Forecast: Consumption of alum by the pulp and paper industry may slow down in the long term, but should grow at an annual rate of 2% to 3% to 1985. 1982 of 112,500-113,000 tons may be down slightly because of the sluggish economy.

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